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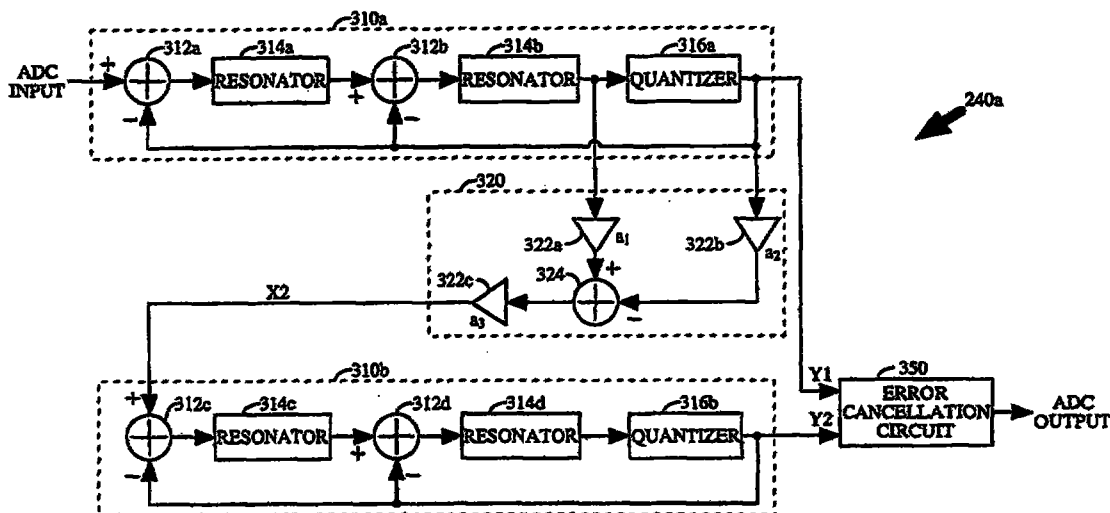
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(54) Title: NOISE CANCELLATION CIRCUIT AND QUADRATURE DOWNCONVERTER ✓

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(57) Abstract

A noise cancellation circuit and quadrature downconverter for use in conjunction with a bandpass receiver. The noise cancellation comprises at least one bandpass decimator and a summer. The output from each loop of a sigma-delta analog-to-digital converter ($\Sigma\Delta$ ADC) is provided to a respective bandpass decimator. Each bandpass decimator comprises an error cancellation filter, a bandpass filter, and a decimator. The transfer functions of the error cancellation filter and bandpass filter are convolved to provide the transfer function of the bandpass decimator. The filtered signal is then decimated by N. The decimation by N can be incorporated within the bandpass decimator such that the bandpass decimator operates at $1/N$ of the frequency of the ADC sampling clock. The signals from all bandpass decimators are summed together and the resultant IF samples are provided to two multipliers which downconvert the IF samples to I and Q baseband samples with an inphase and a quadrature sinusoid, respectively. The baseband samples are lowpass filtered to further remove quantization noise and undesirable signals. The center frequency of the analog input signal, the ADC sampling clock, and the decimation by N can be selected such that an image of the input signal appears at $0.25f_s$, where f_s is the sample rate of the decimated samples.